

Partial English translation of JP 07-047152 A

[0023]

5 [Example 3] A silicon tube was covered with a prepreg composed of reinforcing carbon fibers and epoxy resin by a sheet winding method. A portion of thus obtained tube corresponding to a frame portion 2 was covered with a nonwoven fabric produced by a melt blowing of a maleic acid modified polypropylene resin. The frame  
10 portion 2 thus prepared was covered with a sheet produced by impregnating a carbon fiber aggregate in which carbon fibers were arranged in uni-direction along lengthwise direction of the fibers with a melted maleic acid modified polypropylene resin.

15 [0024] A preform thus produced was mounted on a racket frame metal mold. The preform was heated at 200°C for 20 minutes in a state that the silicon tube was pressured with 10 kg/m<sup>2</sup> of air pressure acted from the both ends thereof. After that, the preform was heated at 130°C for 30 minutes and thereby a racket frame was  
20 produced. After cooling the racket frame to a room temperature, the silicon tube was removed from the racket frame. Since a temperature showing the minimum viscosity of the matrix resin of the carbon fiber reinforced epoxy resin prepreg is about 120°C and the ratio of a viscosity at 30°C to the minimum viscosity is  
25 about 25, the matrix resin flows in a state of softening in a temperature rising process up to 200°C and impregnates into a network structure of the nonwoven fabric, however the matrix resin does not reach the fiber reinforced thermoplastic resin sheet and remains in the nonwoven fabric, since the minimum viscosity of  
30 the matrix resin is high. Further, at about 160°C, the nonwoven

fabric and the matrix resin of the fiber reinforced thermoplastic resin sheet are melted and unified with each other. As a result, a domain in which the thermosetting resin and the thermoplastic resin are intermingled each other in three dimensions and which is resulted from the network structure is formed at the boundary of the fiber reinforced thermosetting resin and the fiber reinforced thermoplastic resin.

[0025] Fig. 2 is a cross section taken along the line A-A of the frame portion of the racket frame. Fig. 3 is an enlarged exemplary diagram of the boundary of the fiber reinforced thermosetting resin and the fiber reinforced thermoplastic resin.

[0026]

[Comparative Example 2] A racket frame was produced according to the same procedure as described for Example 3 except no covering with the nonwoven fabric produced by a melt blowing of a maleic acid modified polypropylene resin. The fiber reinforced thermosetting resin and the fiber reinforced thermoplastic resin showed a clear interface between them and a domain in which the thermosetting resin and the thermoplastic resin are intermingled each other did not exist.